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**Singapore Cancer Registry
Interim Annual Registry Report
Trends in Cancer Incidence in Singapore
2005-2009**

**National Registry of Diseases Office
(NRDO)**

Acknowledgement

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TABLE OF CONTENTS

1	INTRODUCTION.....	4
2	SOURCE OF DATA AND DATA PROCESSING	4
3	FINDINGS	6
3.1	NOTIFICATIONS BY YEAR OF DIAGNOSIS.....	6
TABLE 1:	NOTIFICATIONS OF NEW CASES BY YEAR OF DIAGNOSIS 2005 - 2009	6
3.2	INCIDENCE OF CANCERS FOR THE PERIOD, 2005-2009	6
TABLE 2:	INCIDENCE OF CANCERS BY GENDER 2005 - 2009	6
TABLE 3:	AGE-STANDARDISED INCIDENCE RATES FOR ALL CANCERS BY ETHNIC GROUPS AND GENDER, 2005-2009	7
3.3	TEN MOST FREQUENT CANCERS, 2005-2009	7
TABLE 4:	TEN MOST FREQUENT CANCERS IN SINGAPORE MALES, 2005-2009	8
FIGURE 1:	TEN MOST FREQUENT CANCERS (%) IN SINGAPORE MALES, 2005 -2009	8
TABLE 5:	TEN MOST FREQUENT CANCERS IN SINGAPORE FEMALES, 2005-2009.....	9
FIGURE 2:	TEN MOST FREQUENT CANCERS IN SINGAPORE FEMALES (%), 2005 – 2009	9
3.4	HIGHEST RANKING CANCERS IN DIFFERENT ETHNIC GROUPS, 2005-2009.....	10
TABLE 6:	HIGHEST RANKING CANCERS AMONG CHINESE RESIDENTS, 2005-2009.....	10
TABLE 7:	HIGHEST RANKING CANCERS AMONG MALAY RESIDENTS, 2005-2009	11
TABLE 8:	HIGHEST RANKING CANCERS AMONG INDIAN RESIDENTS, 2005-2009	12
3.5	MORTALITY RATES BY GENDER, 2005-2009	13
TABLE 9:	TEN MOST FREQUENT CANCER DEATHS IN SINGAPORE MALES, 2005-2009 (SOURCE: RBD, MHA).....	13
TABLE 10:	TEN MOST FREQUENT CANCER DEATHS IN SINGAPORE FEMALES, 2005-2009 (SOURCE: RBD, MHA).....	14

CANCER REGISTRY REPORT FOR THE YEARS 2005 – 2009

1 INTRODUCTION

The Singapore Cancer Registry provides information on cancer patterns and trends in Singapore. The comprehensive population-based cancer registration in Singapore began in January 1968. In April 2001, the Cancer Registry came under the auspices of the National Disease Registries Office (NDRO).

MOH enacted the National Registry of Diseases Act in 2007 to enable the disease registries to access medical information while safeguarding data confidentiality. Cancer was the first disease to be covered by the Act. The Act and the subsidiary legislation for cancer were put into effect in August 2008. When the NRD Act was put in place, NDRO was renamed NRDO.

2 SOURCE OF DATA AND DATA PROCESSING

Comprehensive cancer registration was achieved through data obtained from a combination of sources, viz., (a) notifications by the medical profession, (b) pathology records, (c) hospital records, and (d) death certificates. Notifications were made legally mandatory since 2008.

For cancer cases obtained from sources other than physician's notifications, the data were checked against known registered cases in the registry. For missed notifications, doctors-in-charge would be informed and reminded to notify. Despite the reminder system, about 10% of cases were still not notified by physicians, and had to be registered by our registry staff.

Data Processing

Data were captured both manually (from case notes) and through electronic transfer of data from relevant institutions. Information on diagnosis was obtained through hospital, pathology records and official death records. All relevant information of new cases were entered into a computerised system and checked for possible duplication against a master index. The clinical data were then verified by NRDO's doctors and visiting consultant pathologist.

NRDO staff do not have personal contact with the patients and are not involved in the clinical management of the patients.

The Cancer Registry has adopted the International Classification of Diseases for Oncology, 3rd Edition (ICD-O-3) for the classification of primary sites and morphology since 2003.

Cases of carcinoma-in-situ were registered but not included in the derivation of incidence rates. Those which progressed to be invasive at a later stage would be re-registered in the year they were diagnosed as invasive carcinomas.

This report is based primarily on cancers registered in Singapore with the date of diagnosis falling within the period 1/1/2005-31/12/2009. The data reported in the report are as they stood on 03 June 2011.

All the results refer only to the resident population (citizens and permanent residents) only.

Population Denominators

Population denominators were derived using Department of Statistics mid- year population estimates. Crude rates were computed using these denominators.

Segi World Population was used for direct standardisation to calculate age-standardised rates.

3 FINDINGS

3.1 Notifications by Year of Diagnosis

For the period 2005 to 2009, the number of notifications by year of diagnosis showed an upward trend (Table 1).

Table 1: Notifications of New Cases by Year of Diagnosis 2005 - 2009

Year of diagnosis	2005	2006	2007	2008	2009	2005-2009
No. of notifications	9,064	9,400	9,902	10,467	10,579	49,412

3.2 Incidence of Cancers for the Period, 2005-2009

A total number of 49,412 incident cases were diagnosed among the Resident population during the period 2005-2009. Of these 24,052 (48.7%) were reported in males and 25,358 (51.3%) cases in females (Table 2).

Table 2: Incidence of Cancers by Gender 2005 - 2009

Gender	Number	%	CR (95% CI)*	ASR (95% CI)**
Male	24,052	48.7	270.5 (267.1-273.9)	230.2 (227.3-233.2)
Female	25,358	51.3	279.9 (276.4-283.3)	205.9 (203.2-208.5)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

The crude incidence rates for total male and female cancer patients for the period 2005-2009 were 270.5 and 279.9 per 100,000 Singapore resident population per year respectively. The corresponding age-standardised incidence

rates were 230.2 and 205.9 per 100,000 person-years. 95% Confidence Interval (CI) was calculated assuming that the cancer counts followed the Poisson distribution.

Among the males, the crude and age-standardised rates were highest in Chinese males followed by Malays and Indians. Likewise, crude and age-standardised rates were highest in Chinese females followed by Malay and Indian females (Table 3).

Table 3: Age-Standardised Incidence Rates for All Cancers by Ethnic Groups and Gender, 2005-2009

Variables	No	CR (95% CI)*	ASR (95% CI)**
<i>Males:</i>			
Chinese	20,511	309.2 (305.0-313.4)	245.6 (242.2-249.1)
Malay	1,941	158.6 (151.5-165.6)	174.8 (166.8-182.9)
Indians	1,073	132.1 (124.2-140.0)	136.0 (127.5-144.6)
All groups	24,052	270.5 (267.1-273.9)	230.2 (227.3-233.2)
<i>Females:</i>			
Chinese	21,290	311.8 (307.6-316.0)	212.8 (209.9-215.8)
Malay	2,456	200.0 (192.1-207.9)	183.4 (175.9-190.9)
Indian	1,156	151.7 (143.0-160.5)	150.3 (141.4-159.3)
All groups	25,358	279.9 (276.4-283.3)	205.9 (203.2-208.5)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

3.3 Ten Most Frequent Cancers, 2005-2009

Consistent with the findings of the trend report for the period 2004-2008, colorectal, lung and prostate cancer were the top ranked cancers among the male resident population. (Table 4, Figure 1).

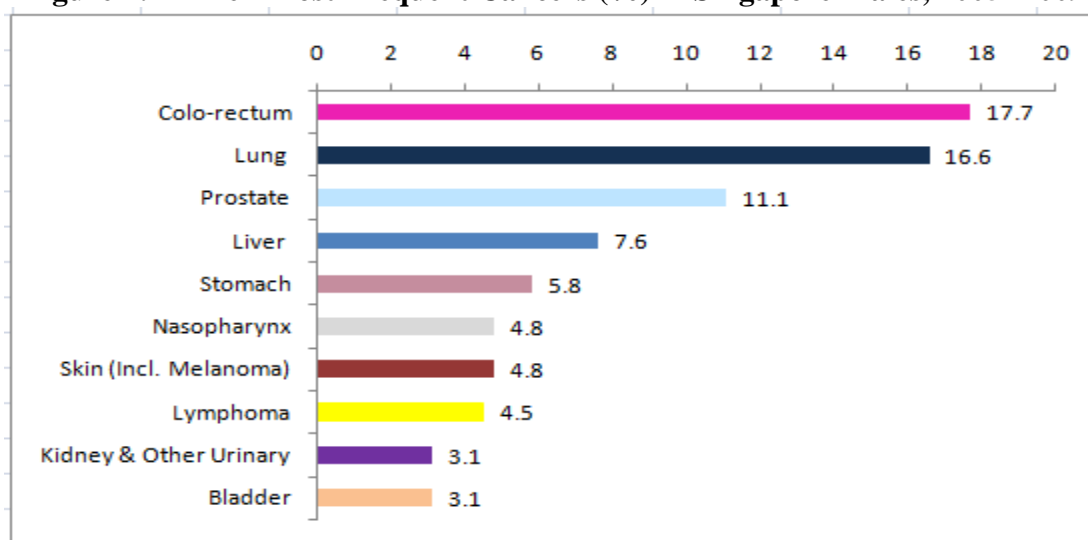
Table 4: Ten Most Frequent Cancers in Singapore Males, 2005-2009

Rank	Site	No.	%	CR (95% CI)*	ASR (95%CI)***
1	Colo-rectum	4,262	17.7	47.9 (46.5-49.4)	40.1 (38.8-41.3)
2	Lung	3,988	16.6	44.8 (43.5-46.2)	38.5 (37.3-39.7)
3	Prostate	2,669	11.1	30.0 (28.9-31.2)	26.7 (25.6-27.7)
4	Liver	1,823	7.6	20.5 (19.6-21.4)	17.2 (16.4-18.0)
5	Stomach	1,407	5.8	15.8 (15.0-16.6)	13.4 (12.7-14.2)
6	Nasopharynx	1,165	4.8	13.1 (12.3-13.9)	9.8 (9.2-10.4)
7	Skin (Incl. Melanoma)	1,159	4.8	13.0 (12.3-13.8)	10.9 (10.2-11.5)
8	Lymphoma	1,083	4.5	12.2 (11.5-12.9)	10.6 (9.9-11.2)
9	Kidney & Other Urinary	753	3.1	8.5 (7.9-9.1)	6.9 (6.4-7.4)
10	Bladder	738	3.1	8.3 (7.7-8.9)	7.0 (6.4-7.5)
	Others	5,005	20.8		
	All Sites	24,052	100	270.5 (267.1-273.9)	230.2 (227.3-233.2)

*CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

Figure 1: Ten Most Frequent Cancers (%) in Singapore Males, 2005 -2009



Among female residents, breast, colorectal and lung cancer were the top ranked cancers among the female residents (Table 5, Figure 2); the findings were similar to the trends reported for the period 2004-2008.

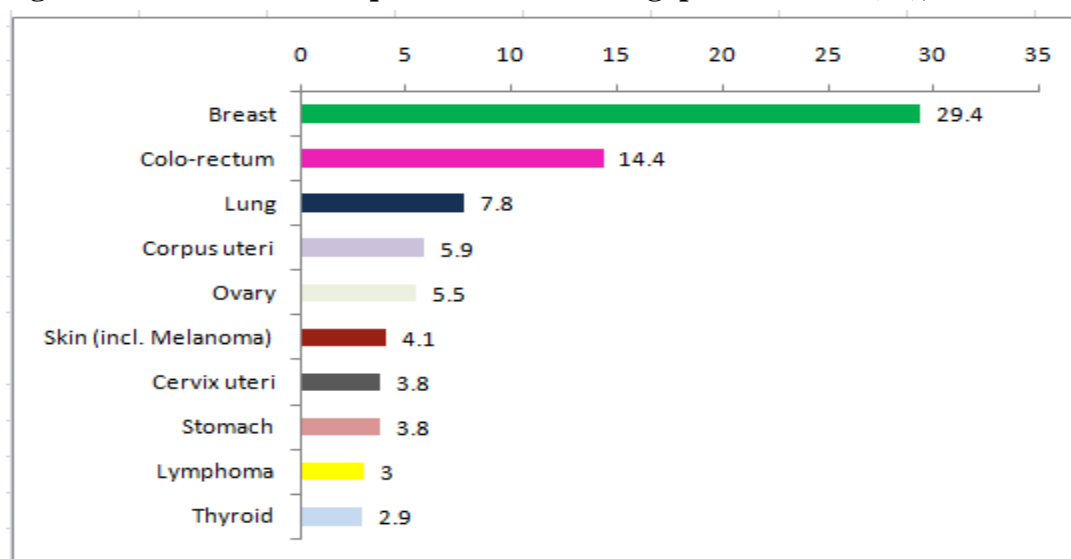
Table 5: Ten Most Frequent Cancers in Singapore Females, 2005-2009

Rank	Site	No.	%	CR (95% CI)*	ASR (95% CI)**
1	Breast	7,458	29.4	82.3 (80.4-84.2)	60.0 (58.6-61.3)
2	Colo-rectum	3,647	14.4	40.3 (38.9-41.6)	28.6 (27.7-29.6)
3	Lung	1,977	7.8	21.8 (20.9-22.8)	15.4 (14.7-16.1)
4	Corpus uteri	1,487	5.9	16.4 (15.6-17.2)	12.1 (11.5-12.7)
5	Ovary	1,405	5.5	15.5 (14.7-16.3)	12.0 (11.3-12.6)
6	Skin (incl. Melanoma)	1,031	4.1	11.4 (10.7-12.1)	7.8 (7.3-8.3)
7	Cervix uteri	958	3.8	10.6 (9.9-11.2)	7.8 (7.3-8.3)
8	Stomach	956	3.8	10.6 (9.9-11.2)	7.3 (6.8-7.8)
9	Lymphoma	758	3.0	8.4 (7.8-9.0)	6.7 (6.2-7.2)
10	Thyroid	735	2.9	8.1 (7.5-8.7)	6.4 (5.9-6.8)
	Others	4,946	19.5		
	All Sites	25,358	100	279.9 (276.4-283.3)	205.9 (203.2-208.5)

*CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

Figure 2: Ten Most Frequent Cancers in Singapore Females (%), 2005 – 2009



3.4 Highest Ranking Cancers in Different Ethnic Groups, 2005-2009

During the period 2005-2009, colorectal cancer, lung cancer and prostate cancer were the three most common male cancers among the three major ethnic groups (Tables 6, 7 and 8).

Table 6: Highest Ranking Cancers among Chinese Residents, 2005-2009

Males					
Rank	Site	Number	%	CR (95% CI)*	ASR (95% CI)**
1	Colo-Rectum	3,757	18.3	56.6 (54.8-58.4)	44.0 (42.5-45.4)
2	Lung	3,447	16.8	52.0 (50.2-53.7)	41.4 (40.0-42.8)
3	Prostate	2,267	11.1	34.2 (32.8-35.6)	27.9 (26.8-29.1)
4	Liver	1,574	7.7	23.7 (22.6-24.9)	18.6 (17.6-19.5)
5	Stomach	1,264	6.2	19.1 (18.0-20.1)	15.1 (14.2-15.9)
6	Nasopharynx	1,068	5.2	16.1 (15.1-17.1)	11.5 (10.8-12.2)
7	Skin (incl. Melanoma)	931	4.5	14.0 (13.1-14.9)	11.1 (10.3-11.8)
8	Lymphoma	838	4.1	12.6 (11.8-13.5)	10.4 (9.6-11.1)
9	Kidney & Other Urinary	625	3.0	9.4 (8.7-10.2)	7.1 (6.6-7.7)
10	Bladder	596	2.9	9.0 (8.3-9.7)	7.0 (6.5-7.6)
	Other sites	4,144	20.2		
	All Sites	20,511	100	309.2 (305.0-313.4)	245.6 (242.2-249.1)

Females					
Rank	Site	Number	%	CR (95% CI)*	ASR (95% CI)**
1	Breast	6,029	28.3	88.3 (86.1-90.5)	60.8 (59.2-62.3)
2	Colo-rectum	3,277	15.4	48.0 (46.3-49.6)	31.0 (29.9-32.1)
3	Lung	1,762	8.3	25.8 (24.6-27.0)	16.5 (15.7-17.3)
4	Corpus Uteri	1,214	5.7	17.8 (16.8-18.8)	12.3 (11.6-13.0)
5	Ovary	1,122	5.3	16.4 (15.5-17.4)	12.0 (11.3-12.8)
6	Skin (incl. Melanoma)	908	4.3	13.3 (12.4-14.2)	8.2 (7.6-8.7)
7	Stomach	876	4.1	12.8 (12.0-13.7)	8.0 (7.5-8.6)
8	Cervix Uteri	802	3.8	11.7 (10.9-12.6)	8.0 (7.5-8.6)
9	Lymphoma	569	2.7	8.3 (7.6-9.0)	6.3 (5.7-6.8)
10	Thyroid	561	2.6	8.2 (7.5-8.9)	6.2 (5.6-6.7)
	Other sites	4,170	19.6		
	All Sites	21,290	100	311.8 (307.6-316.0)	212.8 (209.9-215.8)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

Table 7: Highest Ranking Cancers among Malay Residents, 2005-2009

Males					
Rank	Site	Number	%	CR (95% CI)*	ASR (95% CI)**
1	Lung	379	19.5	31.0 (27.8-34.1)	35.1 (31.4-38.7)
2	Colo-rectum	296	15.2	24.2 (21.4-26.9)	27.1 (23.9-30.3)
3	Prostate	199	10.3	16.3 (14.0-18.5)	19.8 (17.0-22.7)
4	Lymphoma	155	8.0	12.7 (10.7-14.7)	13.6 (11.4-15.8)
5	Liver	153	7.9	12.5 (10.5-14.5)	13.2 (11.0-15.4)
6	Leukaemia	90	4.6	7.4 (5.8-8.9)	8.2 (6.4-9.9)
7	Nasopharynx	79	4.1	6.5 (5.0-7.9)	5.8 (4.4-7.1)
8	Bladder	73	3.8	6.0 (4.6-7.3)	6.6 (5.0-8.1)
9	Stomach	60	3.1	4.9 (3.7-6.1)	5.6 (4.1-7.1)
10	Kidney & Other Urinary	60	3.1	4.9 (3.7-6.1)	5.3 (3.9-6.8)
	Other sites	397	20.5		
	All Sites	1,941	100	158.6 (151.5-165.6)	174.8 (166.8-182.9)
Females					
1	Breast	842	34.3	68.6 (63.9-73.2)	58.7 (54.6-62.8)
2	Colo-rectum	234	9.5	19.1 (16.6-21.5)	19.5 (16.9-22.0)
3	Ovary	177	7.2	14.4 (12.3-16.5)	12.6 (10.7-14.5)
4	Lung	169	6.9	13.8 (11.7-15.8)	13.3 (11.2-15.3)
5	Corpus uteri	157	6.4	12.8 (10.8-14.8)	11.4 (9.5-13.2)
6	Lymphoma	123	5.0	10.0 (8.2-11.8)	9.7 (7.9-11.5)
7	Thyroid	114	4.6	9.3 (7.6-11.0)	8.4 (6.8-10.0)
8	Cervix uteri	103	4.2	8.4 (6.8-10.0)	8.0 (6.4-9.6)
9	Leukaemia	66	2.7	5.4 (4.1-6.7)	5.4 (4.0-6.7)
10	Pancreas	52	2.1	4.2 (3.1-5.4)	4.0 (2.9-5.2)
	Other sites	419	17.1		
	All Sites	2,456	100	200.0 (192.1-207.9)	183.4 (175.9-190.9)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".

Table 8: Highest Ranking Cancers among Indian Residents, 2005-2009

Males					
Rank	Site	Number	%	CR (95% CI)*	ASR (95% CI)**
1	Colo-rectum	154	14.4	19.0 (16.0-22.0)	19.3 (16.1-22.5)
2	Prostate	131	12.2	16.1 (13.4-18.9)	17.5 (14.4-20.7)
3	Lung	126	11.7	15.5 (12.8-18.2)	16.4 (13.4-19.4)
4	Liver	79	7.4	9.7 (7.6-11.9)	9.8 (7.5-12.0)
5	Stomach	68	6.3	8.4 (6.4-10.4)	8.5 (6.4-10.7)
6	Lymphoma	68	6.3	8.4 (6.4-10.4)	8.1 (6.1-10.2)
7	Leukaemia	49	4.6	6.0 (4.3-7.7)	6.5 (4.6-8.4)
8	Bladder	46	4.3	5.7 (4.0-7.3)	5.7 (4.0-7.5)
9	Kidney & Other Urinary	45	4.2	5.5 (3.9-7.2)	5.9 (4.1-7.7)
10	Pancreas	37	3.4	4.6 (3.1-6.0)	4.3 (2.8-5.7)
	Other sites	270	25.2		
	All Sites	1,073	100	132.1 (124.2-140.0)	136.0 (127.5-144.6)
Females					
1	Breast	438	37.9	57.5 (52.1-62.9)	53.8 (48.6-59.0)
2	Corpus uteri	99	8.6	13.0 (10.4-15.6)	12.7 (10.2-15.3)
3	Colo-rectum	94	8.1	12.3 (9.8-14.8)	12.7 (10.0-15.3)
4	Ovary	81	7.0	10.6 (8.3-12.9)	10.0 (7.7-12.2)
5	Lymphoma	53	4.6	7.0 (5.1-8.8)	7.1 (5.1-9.1)
6	Leukaemia	44	3.8	5.8 (4.1-7.5)	5.8 (4.0-7.6)
7	Thyroid	37	3.2	4.9 (3.3-6.4)	4.8 (3.2-6.4)
8	Stomach	34	2.9	4.5 (3.0-6.0)	4.9 (3.2-6.6)
9	Lung	30	2.6	3.9 (2.5-5.3)	4.0 (2.5-5.5)
10	Cervix uteri	24	2.1	3.2 (1.9-4.4)	3.4 (2.0-4.8)
	Other sites	222	19.2		
	All Sites	1,156	100	151.7 (143.0-160.5)	150.3 (141.4-159.3)

* CR Crude rate per 100,000 per year

** ASR Age-standardized rate per 100,000 per year. ASR derived by the direct method using the "World Population".

Among Chinese and Malay females, breast cancer and colorectal cancer were the most common and second most common cancers respectively (Tables 6, 7 and 8). Colorectal cancer was the second most common cancer in Chinese and Malay females whereas it was ranked third in Indian females. Corpus-uteri

cancer was the second most common cancer in Indian females. Lung cancer was the third most common cancer among Chinese females and ovarian cancer was the third most common cancer among Malay females.

Due to the small numbers of Indian residents, the confidence intervals of the incidence rates were wider.

3.5 Mortality Rates by Gender, 2005-2009

Though colorectal cancer and breast cancer were the most common cancers respectively in the male and female resident population, lung cancer and breast cancer had the highest mortality rates in males and females respectively, based on the mortality data from the Registry of Births and Deaths (RBD), Ministry of Home Affairs (MHA) (Tables 9 & 10).

Table 9: Ten Most Frequent Cancer Deaths in Singapore Males, 2005-2009 (Source: RBD, MHA)

Rank	Site	Number	%	CR (95% CI)*	ASR (95% CI)**
1	Lung	3,541	28.7	39.8 (38.5-41.1)	34.2 (33.1-35.4)
2	Colo-rectum	1,809	14.7	20.3 (19.4-21.3)	17.2 (16.4-18.0)
3	Liver	1,561	12.7	17.6 (16.7-18.4)	14.8 (14.1-15.6)
4	Stomach	926	7.5	10.4 (9.7-11.1)	8.8 (8.3-9.4)
5	Pancreas	580	4.7	6.5 (6.0-7.1)	5.5 (5.1-6.0)
6	Nasopharynx	536	4.3	6.0 (5.5-6.5)	4.7 (4.3-5.1)
7	Prostate	529	4.3	5.9 (5.4-6.5)	5.1 (4.7-5.6)
8	Oesophagus	334	2.7	3.8 (3.4-4.2)	3.2 (2.8-3.5)
9	Lymphoma	322	2.6	3.6 (3.2-4.0)	3.1 (2.8-3.4)
10	Leukaemia	279	2.3	3.1 (2.8-3.5)	2.8 (2.5-3.2)
	All Sites	12,322	100	138.6(136.1-141.0)	117.8(115.7-119.9)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the “World Population”.

Table 10: Ten Most Frequent Cancer Deaths in Singapore Females, 2005-2009
(Source: RBD, MHA)

Rank	Site	Number	%	CR (95% CI)*	ASR (95% CI)**
1	Breast	1,769	17.8	19.5 (18.6-20.4)	14.2 (13.5-14.8)
2	Lung	1,714	17.2	18.9 (18.0-19.8)	13.1 (12.5-13.7)
3	Colo-rectum	1,564	15.7	17.3 (16.4-18.1)	11.6 (11.0-12.2)
4	Stomach	652	6.6	7.2 (6.6-7.7)	4.8 (4.4-5.2)
5	Liver	581	5.8	6.4 (5.9-6.9)	4.4 (4.0-4.8)
6	Pancreas	501	5.0	5.5 (5.0-6.0)	3.8 (3.5-4.2)
7	Ovary	477	4.8	5.3 (4.8-5.7)	3.8 (3.4-4.1)
8	Cervix Uteri	367	3.7	4.1 (3.6-4.5)	2.9 (2.6-3.2)
9	Lymphoma	237	2.4	2.6 (2.3-2.9)	2.1 (1.8-2.3)
10	Leukaemia	223	2.2	2.5 (2.1-2.8)	1.8 (1.5-2.0)
	All Sites	9,951	100	109.8(107.7-112.0)	76.8(75.3-78.4)

* CR Crude rate per 100,000 per year

** ASR Age-standardised rate per 100,000 per year. ASR derived by the direct method using the "World Population".